

Test Paper : II
Test Subject : LIFE SCIENCES
Test Subject Code : A-09-02

Test Booklet Serial No. : _____
OMR Sheet No. : _____
Hall Ticket No.

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(Figures as per admission card)

Name & Signature of Invigilator

Name : _____ Signature : _____

Paper : II
Subject : LIFE SCIENCES

Time : 1 Hour 15 Minutes

Maximum Marks : 100

Number of Pages in this Booklet : 16

Number of Questions in this Booklet : 50

Instructions for the Candidates

- Write your Hall Ticket Number in the space provided on the top of this page.
- This paper consists of fifty multiple-choice type of questions.
- At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below :
 - To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet.
 - Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.**
 - After this verification is over, the Test Booklet Number should be entered in the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
- Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
Example :

(A)	(B)	●	(D)
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where (C) is the correct response.
- Your responses to the items are to be indicated in the **OMR Sheet given to you**. If you mark at any place other than in the circle in the Answer Sheet, it will not be evaluated.
- Read instructions given inside carefully.
- Rough Work is to be done in the end of this booklet.
- If you write your name or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
- You have to return the test question booklet and OMR Answer Sheet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall.
- Use only Blue/Black Ball point pen.**
- Use of any calculator or log table etc., is prohibited.**
- There is no negative marks for incorrect answers.**

అభ్యర్థులకు సూచనలు

- ఈ పుట పై భాగంలో ఇవ్వబడిన స్థలంలో మీ హాల్ టికెట్ నంబరు రాయండి.
- ఈ ప్రశ్న పత్రము యాభై బహుళైచ్ఛిక ప్రశ్నలను కలిగి ఉంది.
- పరీక్ష ప్రారంభమైన ఈ ప్రశ్నాపత్రము మీకు ఇవ్వబడుతుంది. మొదటి ఐదు నిమిషములలో ఈ ప్రశ్నాపత్రమును తెరిచి కింద తెలిపిన అంశాలను తప్పనిసరిగా సరిచూసుకోండి.
 - ఈ ప్రశ్న పత్రమును చూడడానికి కవర్ పేజీ అంచున ఉన్న కాగితపు సీలును చించండి. స్టిక్కర్ సీలులేని మరియు ఇదివరకే తెరిచి ఉన్న ప్రశ్నాపత్రమును మీరు అంగీకరించవద్దు.
 - కవరు పేజీ పై ముద్రించిన సమాచారం ప్రకారం ఈ ప్రశ్నపత్రములోని పేజీల సంఖ్యను మరియు ప్రశ్నల సంఖ్యను సరిచూసుకోండి. పేజీల సంఖ్యకు సంబంధించి గానీ లేదా సూచించిన సంఖ్యలో ప్రశ్నలు లేకపోవుట లేదా నిజప్రతి కాకపోవుట లేదా ప్రశ్నలు క్రమపద్ధతిలో లేకపోవుట లేదా ఏదైనా తేడాలుండటం వంటి దోషస్వరూపితమైన ప్రశ్న పత్రాన్ని వెంటనే మొదటి ఐదు నిమిషాల్లో పరీక్షా పర్యవేక్షకునికి తిరిగి ఇప్పిచేసి దానికి బదులుగా సరిగ్గా ఉన్న ప్రశ్నపత్రాన్ని తీసుకోండి. తదనంతరం ప్రశ్నపత్రము మార్చబడదు అదనపు సమయం ఇవ్వబడదు.
 - పై విధంగా సరిచూసుకొన్న తర్వాత ప్రశ్నాపత్రం సంఖ్యను **OMR** పత్రము పై అదేవిధంగా **OMR** పత్రము సంఖ్యను ఈ ప్రశ్నాపత్రము పై నిర్దిష్టస్థలంలో రాయవలెను.
- ప్రతి ప్రశ్నకు నాలుగు ప్రత్యామ్నాయ ప్రతిస్పందనలు (A), (B), (C) మరియు (D) లుగా ఇవ్వబడ్డాయి. ప్రతిప్రశ్నకు సరైన ప్రతిస్పందనను ఎన్నుకొని కింద తెలిపిన విధంగా **OMR** పత్రములో ప్రతి ప్రశ్నా సంఖ్యకు ఇవ్వబడిన నాలుగు వృత్తాల్లో సరైన ప్రతిస్పందనను సూచించే వృత్తాన్ని బాల్ పాయింట్ పెన్ తో కింద తెలిపిన విధంగా పూరించాలి.
ఉదాహరణ :

(A)	(B)	●	(D)
-----	-----	---	-----

(C) సరైన ప్రతిస్పందన అయితే
- ప్రశ్నలకు ప్రతిస్పందనలను ఈ ప్రశ్నపత్రముతో ఇవ్వబడిన **OMR** పత్రము పైన ఇవ్వబడిన వృత్తాల్లోనే పూరించి గుర్తించాలి. అలాకాక సమాధాన పత్రంపై వేరొక చోట గుర్తిస్తే మీ ప్రతిస్పందన మూల్యాంకనం చేయబడదు.
- ప్రశ్న పత్రము లోపల ఇచ్చిన సూచనలను జాగ్రత్తగా చదవండి.
- చిత్తుననిన ప్రశ్నపత్రము చివర ఇచ్చిన ఖాళీస్థలములో చేయాలి.
- OMR** పత్రము పై నిర్దిష్ట స్థలంలో సూచించవలసిన వివరాలు తప్పించి ఇతర స్థలంలో మీ గుర్తింపును తెలిపే విధంగా మీ పేరు రాయడం గానీ లేదా ఇతర చిహ్నాలను పెట్టడం గానీ చేసినట్లయితే మీ అనర్హతకు మీరే బాధ్యులవుతారు.
- పరీక్ష పూర్తయిన తర్వాత మీ ప్రశ్నపత్రాన్ని మరియు **OMR** పత్రాన్ని తప్పనిసరిగా పరీక్షపర్యవేక్షకుడికి ఇవ్వాలి. వాటిని పరీక్ష గది బయటకు తీసుకువెళ్లకూడదు.
- నీలి/నల్ల రంగు బాల్ పాయింట్ పెన్ మాత్రమే ఉపయోగించాలి.
- లాగరిథమ్ టేబుల్స్, క్యాలిక్యులేటర్లు, ఎలక్ట్రానిక్ పరికరాలు మొదలగునవి పరీక్షగదిలో ఉపయోగించడం నిషేధం.
- తప్పు సమాధానాలకు మార్కులు తగ్గింపు లేదు.





LIFE SCIENCES

Paper – II

1. Eukaryotic mRNA can be separated from the total RNA by
 - (A) Size Exclusion chromatography
 - (B) Ion-Exchange chromatography
 - (C) Affinity chromatography
 - (D) Partition chromatography
2. Which of the following involves the combining of two cells without cell walls from different plants ?
 - (A) Clonal propagation
 - (B) Hybridization
 - (C) Protoplast fusion
 - (D) Mutant selection
3. Non-polar amino acid residues are found mostly
 - (A) In the core of proteins
 - (B) On the surface of proteins
 - (C) On alpha helix
 - (D) In no specific region
4. Which of the following organelles does not carry out transcription ?
 - (A) Nucleus
 - (B) Peroxisome
 - (C) Chloroplast
 - (D) Mitochondrion
5. Given below are two statements

Assertion (A): Hexokinase and Glucokinase have low and high k_m towards glucose respectively.

Reason (R) : Glucokinase operates under high glucose concentration only .

Which of these statements are correct ?

 - (A) A is correct but R is wrong
 - (B) R is correct but A is wrong
 - (C) Both A and R are correct
 - (D) Both A and R are wrong

6. Given below are two statements. One labelled as Assertion (A) and the other labelled as Reason (R)

Assertion (A): Protooncogenes are found in most of the animal cells.

Reason (R) : They are related to viral oncogenes.

In the context of these statements which one of the following is correct ?

- (A) A is correct but R is wrong
- (B) Both A and R are correct
- (C) A is wrong but R is correct
- (D) Both A and R are wrong

7. Given below are two statements

Assertion (A): All eukaryotic mRNAs are capped at 5' end

Reason (R) : 5' cap is not essential for efficient mRNA translation

Which of these statements are correct ?

- (A) A is correct, R is wrong
- (B) Both A and R are correct
- (C) A is wrong R is correct
- (D) Both A and R are wrong

8. Match the following

- | | |
|-------------------------------|---------------------|
| I. Nuclear Magnetic Resonance | 1. Microwaves |
| II. Electron Spin Resonance | 2. Radiowaves |
| III. Raman spectroscopy | 3. UV/Visible light |
| IV. Spectrophotometry | 4. Infrared waves |

- | | I | II | III | IV |
|-----|---|----|-----|----|
| (A) | 4 | 3 | 2 | 1 |
| (B) | 1 | 2 | 4 | 3 |
| (C) | 2 | 1 | 4 | 3 |
| (D) | 2 | 3 | 4 | 1 |

9. Match the following

- | | |
|----------------------------|---------------------------------|
| I. Bt cotton | 1. Improved shelf life |
| II. Flavr Savr Tomato | 2. Improved nutritional quality |
| III. Roundup Ready Sorghum | 3. Pest resistance |
| IV. Golden Yellow Rice | 4. Herbicide tolerance |

- | | I | II | III | IV |
|-----|---|----|-----|----|
| (A) | 4 | 2 | 1 | 3 |
| (B) | 3 | 1 | 4 | 2 |
| (C) | 4 | 2 | 3 | 1 |
| (D) | 3 | 2 | 1 | 4 |

10. Viruses that persist in the cell and cause recurrent disease are called

- (A) Oncogenic viruses
- (B) Latent viruses
- (C) Cytopathic viruses
- (D) Resistant viruses



11. Assertion (A) : Indirect somatic embryogenesis, embryos are developed without going through callus formation.

Reason (R) : This is possible due to the presence of pre-embryonically determined cells.

- (A) Both A and R are true but R is not correct reason for A
 (B) A is false but R is true
 (C) A is true but R is false
 (D) Both A and R are true and R is the correct reason for A

12. In complement cascade the complement 1 activate as follows

- I. C1q
 II. C1r
 III. C1s
 IV. C1d
 (A) I, II, III, IV
 (B) II, III, IV, I
 (C) III, IV, II, I
 (D) IV, III, II, I

13. Match the following

- | | |
|----------------------------|---------------------------|
| I. Pyridoxal phosphate | 1. Vitamin B ₁ |
| II. Niacin | 2. Vitamin B ₆ |
| III. Thiamin pyrophosphate | 3. Vitamin B ₂ |
| IV. Flavin nucleotides | 4. Vitamin B ₃ |

- | | I | II | III | IV |
|-----|---|----|-----|----|
| (A) | 1 | 2 | 3 | 4 |
| (B) | 2 | 4 | 1 | 3 |
| (C) | 4 | 3 | 2 | 1 |
| (D) | 3 | 4 | 1 | 2 |

14. The protein structure is stabilized by

- I. Hydrogen bonds
 II. Disulphide bonds
 III. Glycolidic bonds
 IV. Hydrophobic interactions
 (A) I and II are correct
 (B) II, III and IV are correct
 (C) I and IV are correct
 (D) I, II and IV are correct

15. Two dimensional electrophoresis involves

- (A) SDS-PAGE in 1st dimension and IEF in 2nd dimension
 (B) IEF in 1st dimension and SDS-PAGE in 2nd dimension
 (C) IEF in 1st dimension and PFGE in 2nd dimension
 (D) IEF in 1st dimension and TLC in 2nd dimension

16. Electron Transport chain contains the following components :

- I. Cytochrome C-oxidase
- II. Succinate/COQ oxidoreductase
- III. NADH : COQ oxidoreductase
- IV. Coenzyme Q : cytochrome oxidoreductase

Choose correct one of following sequences

- (A) III, II, IV, I
- (B) II, III, IV, I
- (C) I, IV, III, II
- (D) IV, III, II, I

17. The correct order of chromatin organization from the following is

- I. Nucleosome
- II. Solenoid
- III. Double stranded DNA
- IV. Chromosome

Choose the correct sequence

- (A) I, IV, II, III
- (B) III, I, II, IV
- (C) I, II, III, IV
- (D) III, IV, I, II

18. Give the correct sequence of following steps used in Southern hybridization

- 1. Blotting membrane
- 2. Restriction digestion
- 3. Detection
- 4. Separation by electrophoresis

Choose the correct one

- (A) 4, 1, 2, 3
- (B) 2, 4, 1, 3
- (C) 4, 2, 1, 3
- (D) 2, 1, 4, 3

19. According to ICBN Rules the suffix of family name ends with “aceae”, whereas prefix refers to

- (A) Specific epithet
- (B) Characteristic feature of the family
- (C) Generic epithet
- (D) Specific character of basic species



20. Pick up the correct combination of the following using valid name and part used

- (A) Millets-Sorghum vulgare - Poaceae-Caryopsis
Pulses-Cajanus cajan-Fabaceae-Cotyledons
Fibers-Gossypium herbaceum-Malvaceae-Epidermal hairs of seed
Fruit-Mangifera indica-Anacardiaceae-Epicarp and Mesocarp of drupe
- (B) Millets-Sorghum vulgare - Poaceae-Caryopsis
Pulses-Cajanus cajan-Fabaceae-Cotyledons
Fibers-Gossypium herbaceum-Malvaceae-Epidermal hairs of seed
Fruit-Mangifera indica-Anacardiaceae-Epicarp and Mesocarp of drupe
- (C) Millets-Sorghum vulgare - Poaceae-Caryopsis
Pulses-Cajanus cajan-Fabaceae-Cotyledons
Fibers-Gossypium herbaceum-Malvaceae-Epidermal hairs of fruit
Fruit-Mangifera indica-Anacardiaceae-Epicarp and Mesocarp of drupe
- (D) Millets – Sorghum vulgare - Poaceae-Caryopsis
Pulses-Cajanus cajan-Fabaceae-Cotyledons
Fibers-Gossypium herbaceum-Malvaceae-Epidermal hairs of seed
Fruit-Mangifera indica-Anacardiaceae-Mesocarp and endocarp of drupe

21. **Assertion (A)** : Apospory is not uncommon in some ferns like Pteris

Reason (R) : In ferns some times the prothallus is formed from vegetative parts of sporophytic plant

- (A) Both A and R are true, R is the correct explanation of A
- (B) Both A and R are true, but R is not the correct explanation of A
- (C) Both A and R are not true
- (D) A is true, but R is false

22. This biosphere reserve is recently notified by the Government of India

- (A) Valley of Flowers
- (B) Nanda Devi
- (C) Nallamalais
- (D) Seshachalam

23. Epiphytes are rare in Delhi because it has

- (A) Moist climate
- (B) Semi-arid climate
- (C) Large amount of factories
- (D) Large number of automobiles

24. Arrange the following in progressive manner with special reference to ecological succession in xerosere

- I. Funaria
- II. Rhizocarpon
- III. Poa
- IV. Trees

- (A) I, II, III, IV
- (B) II, I, IV, III
- (C) II, I, III, IV
- (D) I, III, II, IV

25. Match the following :

- | | |
|--------------------------------|------------------|
| 1. Aquatic habitats | I. Sciophytes |
| 2. Community in abundant light | II. Xerophytes |
| 3. Community in shade | III. Heliophytes |
| 4. Community in dry conditions | IV. Mesophytes |
| | V. Hydrophytes |

- | | 1 | 2 | 3 | 4 |
|-----|---|-----|----|-----|
| (A) | V | III | I | II |
| (B) | V | IV | I | II |
| (C) | V | III | II | I |
| (D) | V | II | I | III |

26. Pick up the sources of air pollution from the following :

- I. Volcanic eruptions
- II. Dust storms
- III. Domestic sewage
- IV. Pulp mills
- V. CFMs

- (A) I, II and III
- (B) I, II, III and V
- (C) II, IV and V
- (D) I, II and V

27. Which of the following has more redox potential (E_0) value ?

- (A) Flavo proteins
- (B) Cytochrome B
- (C) Nicotinamide adenine dinucleotide
- (D) Ubiquinone

28. Respiratory quotient (R.Q) value of a simple sugar is

- (A) Zero
- (B) More than one
- (C) Less than one
- (D) Equal to one



29. Given below are two statements, one labeled as Assertion (A), and the other labeled as Reason (R)

Assertion (A): The pronounced decrease in quantum yield at red zone (greater than 680 nm) is termed as red drop. It is also known as Emerson's effect.

Reason (R) : Discovery of Emerson's effect has clearly shown the existence of two photosystems.

In the context of the above two statements which one of the following is correct ?

Codes :

- (A) A is correct but R is wrong
- (B) A is wrong but R is correct
- (C) A is correct, R is also correct
- (D) A is wrong, R is also wrong

30. Arrange the following compounds in order in which they appear in Krebs cycle. Use the code given below.

- I. Succinic acid
- II. Fumaric acid
- III. Oxaloacetic acid
- IV. Malic acid

Code :

- (A) III, IV, II, I
- (B) I, II, IV, III
- (C) II, III, I, IV
- (D) I, III, II, IV

31. Which one of the following combination of chromosome number (N) and DNA content (C) is true of the diplotene stage of mammalian oocytes ?

- (A) 1N & 2C
- (B) 2N & 4C
- (C) 2N & 2C
- (D) 1N & 4C

32. **Assertion (A) :** As polyspermy is being slowly blocked, the cortical granules explode and release their contents into the perivitelline space.

Reason (R) : Quick blocking of polyspermy sets in depolarization of the egg plasmalemma and mobilization of Ca^{2+} from stores within the egg.

- (A) Both A and R are true and R is the correct explanation of A
- (B) Both A and R are true but R is not the correct explanation of A
- (C) A is true but R is false
- (D) Both A and R are false

33. During early human brain development primary vesicles listed in List I gives rise to derivatives in List II

List I	List II
I. Telencephalon	1. Mid brain
II. Mesencephalon	2. Optic vesicle
III. Diencephalon	3. Cerebellum
IV. Myelencephalon	4. Hippocampus

Code :

	I	II	III	IV
(A)	4	1	2	3
(B)	2	1	3	4
(C)	4	2	1	3
(D)	3	2	1	4

34. During neural tube formation in the chick embryo the neural plate involves following events in sequences

- (A) Shaping, convergence, folding, elevation, clockwise
 (B) Convergence, elevation, folding, shaping, clockwise
 (C) Shaping, folding, elevation, convergence, clockwise
 (D) Convergence, shaping, elevation, folding, clockwise

35. The order of evolutionary pattern of nitrogen excretion in animals is as follows

- (A) Urea, Uric acid, Ammonia
 (B) Ammonia, Uric acid, Urea
 (C) Urea, Ammonia, Uric acid
 (D) Ammonia, Urea, Uric acid

36. Mammalian heterodonty is expressed by a dental formula. Match the dental formula to the organism

List I	List II
I. $\frac{0, 0, 3, 3}{3, 1, 3, 3} = 32$	1. Rabbit
II. $\frac{2, 0, 3, 3}{1, 0, 2, 3} = 28$	2. Man
III. $\frac{1, 0, 2, 3}{1, 0, 1, 3} = 22$	3. Sheep
IV. $\frac{2, 1, 2, 3}{2, 1, 2, 3} = 32$	4. Squirrel

	I	II	III	IV
(A)	3	1	4	2
(B)	2	1	3	4
(C)	1	4	2	3
(D)	4	1	2	3



37. Assertion (A) : Absorption of the products of carbohydrates and protein digestion are against a concentration gradient, whereas the absorption of the products of lipids are different.

Reason (R) : The end products of carbohydrates, proteins are absorbed into the epithelial cells of intestine is by active transport, whereas the products of lipids are by diffusion.

In the context of the above two statements which one of the following is correct

- (A) A is correct but R is wrong
- (B) Both A and R are correct
- (C) A is wrong but R is correct
- (D) Both A and R are wrong

38. The Bohr effect represents an interaction between

- (A) O_2 equilibrium and Electron dissociation of Hb
- (B) O_2 equilibrium and Proton dissociation of Hb
- (C) CO_2 equilibrium and Electron dissociation of Hb
- (D) CO_2 equilibrium and Proton dissociation of Hb

39. Which one of the following chromosome combinations is expected in an offspring obtained after selfing a plant having AA BB CC DD homologous pairs ?

- I. AA
- II. BB
- III. CC
- IV. DD

The correct sequence of the above is

- (A) I, III, II and IV
- (B) I, II, III and IV
- (C) I, IV, III and II
- (D) I, III, IV and II

40. Match the most commonly detected blood-group systems with probable number of their alleles

List I		List II	
Blood Group		Alleles	
I. ABo		1	20 ⁺
II. MN ^{Sc}		2	5
III. P		3	30 ⁺
IV. Rh		4	4
	I	II	III
(A)	2	1	4
(B)	1	2	3
(C)	4	3	2
(D)	3	4	2

41. **Assertion (A)** : Gene is a biological entity- a heritable function detected by observing the effect of a mutation. A gene consists of all the DNA sequences necessary to produce a single peptide or RNA product.

Reason (R) : The gene is single, contiguous protein encoding stretch of DNA.

In the context of the above two statements, which one of the following is correct ?

- (A) Both A and R are true and R is correct explanation of A
- (B) Both A and R are true but R is not the correct explanation of A
- (C) A is true but R is false
- (D) Both A and R are false

42. Sex linked genes on the X-chromosome of Drosophila melanogaster mapped and found to have a length of

- (A) 78 map units
- (B) 68 map units
- (C) 80 map units
- (D) 82 map units

43. What are the two theories that are combined in the synthetic theory of evolution ?

- (A) Darwin's theory of natural selection and Lamarck's theory of use and disuse
- (B) Mendel's theory of heredity and Heckel's theory of ontogeny repeats phylogeny
- (C) Darwin's theory of natural selection and Mendel's theory of heredity
- (D) Lamarck's theory of use and disuse and Heckel's theory of ontogeny repeats phylogeny



44. Match the various types of isolating mechanisms that prevent gene exchange between population of related species of organisms

List I

List II

- | | |
|----------------------------|---|
| I. Habitat Isolation | 1. Populations are isolated by different and incompatible behaviour |
| II. Seasonal Isolation | 2. Restricted by differences in structure of reproductive organs |
| III. Ethological Isolation | 3. Populations live in same regions but occupy different habitats |
| IV. Mechanical Isolation | 4. Population exist in the same region but are sexually mature at different times |

- | | I | II | III | IV |
|-----|---|----|-----|----|
| (A) | 1 | 3 | 4 | 2 |
| (B) | 3 | 4 | 1 | 2 |
| (C) | 2 | 4 | 1 | 3 |
| (D) | 3 | 2 | 1 | 4 |

45. Arrange following fossils in a row lead from more like reptiles to more like mammals

I. Pelycosauria

II. Cyanodonta

III. Therapsida

IV. Mammalia

(A) I, II, III and IV

(B) II, III, I and IV

(C) I, III, II and IV

(D) II, I, III and IV

46. **Assertion (A)** : The finches beaks evolved to be larger in times of food shortage and smaller in times of abundance.

Reason (R) : The food supply fluctuated through time according to weather.

(A) Both A and R are true and R is the correct explanation

(B) Both A and R are true, but R is not the correct explanation

(C) A is true but R is false

(D) A is false but R is true

Q.No. 47–50

Read the passage below, and answer the questions that follow based on your understanding of the passage.

DNA replication takes place at a 'Y'-shaped structure called a replication fork. A self correcting DNA polymerase enzyme catalyzes nucleotide polymerization in a 5'-to-3' direction, copying a DNA template strand with remarkable fidelity. Since the two strands of a DNA double helix are antiparallel, this 5'-to-3' DNA synthesis can take place continuously on only one of the strands at a replication fork (the leading strand). On the lagging strand, short DNA fragments must be made by a 'backstitching' process. Because the self correcting DNA polymerase cannot start a new chain, these

lagging strand DNA fragments are primed by a short RNA primer molecules that are subsequently erased and replaced with DNA.

DNA replication requires the cooperation of many proteins. These include

- i. DNA polymerase and DNA primase to catalyze nucleotide triphosphate polymerization;
- ii. DNA helicases and single strand DNA-binding (SSB) proteins to help in opening up DNA helix so that it can be copied ;
- iii. DNA ligase and an enzyme that degrades RNA primers to seal together the discontinuously synthesized lagging-strand DNA fragments; and



iv. DNA topoisomerases to help to relieve helical winding and DNA tangling problems. Many of these proteins associate with each other at a replication fork to form a highly efficient 'replication machine', through which the activities and spatial movements of the individual components are coordinated.

47. Helical winding of DNA is removed by an enzyme

- (A) DNA polymerase
- (B) DNA primase
- (C) DNA helicase
- (D) DNA topoisomerase

48. Discontinually synthesized lagging strand DNA fragments are sealed by which one of the following enzyme ?

- (A) RNA primase
- (B) DNA ligase
- (C) Single strand binding proteins
- (D) DNA polymerase

49. Which one of the following four statements is incorrect ?

- (A) Leading strand is synthesized in $5' \rightarrow 3'$ direction
- (B) Lagging strand is synthesized by 'backstitching' process
- (C) DNA polymerase can directly synthesize new chain of DNA
- (D) Antiparallel strands of DNA are separated by helicases

50. Which one of the following four statements is correct ?

- (A) Leading strands is synthesized in fragments
- (B) DNA fragments synthesis is initiated by DNA primer
- (C) Leading and lagging strands are synthesized in different manner because the DNA strands are antiparallel
- (D) DNA polymerase alone coordinates replication of DNA process

Space for Rough Work